

### Claims

1. Device for determining the properties of surfaces having:

at least one first radiation means having at least one radiation source which directs substantially collimated radiation at a predetermined angle towards a measurement surface;

at least one second radiation means having at least one radiation source which projects substantially non-collimated radiation onto the measurement surface;

at least one radiation detector means which captures at least a portion of the radiation reflected and/or diffused off the measurement surface and emits at least one measurement signal which is characteristic of the reflected and/or diffused radiation,

**characterized in that**

the space above the measurement surface has substantially radiation-absorbing properties.

2. Device according to claim 1,

**characterized in that**

the angle formed by a first geometrical connecting axis from the at least one radiation detector means to the geometrical center of the measurement surface and projection of said first geometrical connecting axis to the measurement surface, and preferably also that angle

formed by a second geometrical connecting axis from the at least one first radiation means to the geometrical center of the measurement surface and projection of said second connecting axis onto the measurement surface, are variable.

3. Device in particular according to at least one of the preceding claims

**characterized in that**

the distance from said first radiation means to the measurement surface is between 1 cm and 30 cm, preferred between 2 cm and 20 cm, particularly preferred between 2 cm and 7 cm.

4. Device in particular according to at least one of the preceding claims

**characterized in that**

substantially non-collimated radiation is emitted onto the measurement surface from a plurality of second radiation means.

5. Device in particular according to at least one of the preceding claims

**characterized in that**

said at least one second radiation means comprises at least one radiation diffusor means.

6. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one radiation diffuser means is selected from a group of radiation diffuser means comprising radiation diffuser disks, frosted glass disks, diffuser films and the like.

7. Device in particular according to at least one of the preceding claims

**characterized in that**

said diffuser surface of said at least one radiation diffuser means is mounted at a specified diffuser surface angle relative a geometrical connecting axis from said radiation means to the geometrical center of the measurement surface, said angle being between 0 degrees and 90 degrees, preferred between 30 degrees and 90 degrees, particularly preferred between 75 degrees and 90 degrees.

8. Device in particular according to at least one of the preceding claims

**characterized in that**

the spatial orientation and position of the diffuser surface of at least one radiation diffuser means is variable relative the geometrical connecting axis from said radiation means to the geometrical center of the measurement surface.

9. Device in particular according to at least one of the preceding claims

**characterized in that**

said at least one first and at least one second radiation means are positioned in a housing above the measurement surface.

10. Device in particular according to at least one of the preceding claims

**characterized in that**

the space inside the housing has substantially radiation-absorbing properties.

11. Device in particular according to at least one of the preceding claims

**characterized in that**

said housing is substantially configured radiation-proof, preferably light-proof, such that substantially no radiation can enter the housing other than such radiation as diffused and/or reflected off the measurement surface.

12. Device in particular according to at least one of the preceding claims

**characterized in that**

said second radiation means are positioned on a geometrical spherical surface or the geometrical surface of a rotational ellipsoid above the measurement surface.

13. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one radiation source is variable in at least one radiation parameter selected from a group comprising radiation intensity, radiation wavelength, direction of radiation polarization, temporal radiation intensity modulation and the like.

14. Device in particular according to at least one of the preceding claims

**characterized in that**

at least two radiation sources are variable independent of each other in at least one radiation parameter.

15. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one radiation source is selected from a group of radiation sources comprising thermal radiation sources, in particular but not exclusively light bulbs, halogen light bulbs, coherent and non-coherent semiconductor radiation sources, gas discharge radiation sources, lasers and the like.

16. Device in particular according to at least one of the preceding claims

**characterized in that**

at least two radiation sources and/or radiation detector means have different spectral radiation characteristics.

17. Device in particular according to at least one of the preceding claims

**characterized in that**

the radiation from said first radiation means is collimated by at least one radiation directing means.

18. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one radiation directing means comprises at least one radiation directing component selected from a group of radiation directing components comprising lens components, micro lens components, micro lens arrays, diffracting components, reflector components, in particular but not exclusively parabolic reflectors, grating components, volume grating components, holographic components and the like.

19. Device in particular according to at least one of the preceding claims

**characterized in that**

said first radiation means comprises at least one diaphragm means, preferably but not limited to apertured diaphragms positioned in the path of radiation.

20. Device in particular according to at least one of the preceding claims

**characterized in that**

said device is preferably movable relative the measurement surface such that the distance between the radiation means and the measurement surface remains substantially constant.

21. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one travel measurement means is provided which emits at least one measurement signal which is

characteristic of the traveled distance of the relative movement from the device to the measurement surface.

22. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one travel measurement means is positioned inside and/or outside the housing.

23. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one coating-thickness measurement means is provided for determining the coating thickness of the measurement surface to be examined comprising at least one coating thickness sensor which emits a measurement signal representative of the coating thickness to be determined.

24. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one coating-thickness measurement means is positioned inside and/or outside the housing.

25. Device in particular according to at least one of the preceding claims

**characterized in that**

at least one processor means and one memory means is provided which allow an allocation of the measurement signals of the radiation detector means and/or the

measurement signals of the travel measurement means and/or the coating-thickness measurement means to specified locations, in particular but not exclusively to the same location on the measurement surfaces.

26. Method for determining the properties of surfaces in particular using a device according to at least one of the preceding claims

**characterized in that**

at least one first radiation means according to at least one of the preceding claims and

at least one second radiation means according to at least one of the preceding claims projects at least a portion of the radiation from its at least one radiation source onto the measurement surface and

at least one provided radiation detector means captures at least a portion of the radiation reflected and/or diffused off the measurement surface and emits at least one measurement signal which is characteristic of the reflected radiation,

and at least one control means is provided for controlling the capture of the measurement signals of the radiation detector means,

and at least one output means is provided for outputting the at least one measurement result.

27. The method according to claim 26,

**characterized in that**

at least one processor means is provided for evaluating the measurement signals and deriving therefrom at least



one parameter which characterizes the properties of the measurement surface and which can be output at least on one output means.

28. Device in particular according to at least one of the claims 26 and 27

**characterized in that**

at least one control means is provided for controlling the capture of the measurement signals from the radiation detector means and/or the travel measurement means and/or the coating-thickness measurement means and stores same in at least one provided memory means.

29. Device in particular according to at least one of the claims 26, 27 and 28

**characterized in that**

the radiation from said second radiation means is substantially reflected and/or diffused only once off the measurement surface and/or off a surface substantially parallel thereto.